

**COMPARATIVE ANALYSIS OF BACTERIOLOGICAL
PROFILE OF URINE AND STENT CULTURE AMONG
PATIENTS WITH URETERIC DOUBLE J STENT**

Abstract

BACKGROUND

A common indication in urological pathologies and especially in instances of ureteric calculi/obstruction, is the placement of ureteric catheter such as the double J stent. 76% of patient with double J stent may encounter adverse outcome owing to bacterial colonization of their stents. Though antibiotic administration may help counter the situation, the implicated microorganisms are hard to determine. One may suggest that a urine culture may offer insight into the matter, however, little is known how bacteriology of the urine and stent culture resemble and thus a comparative analysis is much needed.

OBJECTIVE

To compare the bacteriologic profile of urine and stent culture to determine the incidence and etiology of bacteriuria among patients with ureteric double J stent

METHODOLOGY

This cross-sectional analysis, was conducted upon a sample of 219 patients (of either gender, aged 10 to 70 years) presenting for ureteric double J stent removal from June 2021 to February 2022 at Ziauddin University Hospital, Karachi. After taking written informed consent, data was recorded onto a pre-structured questionnaire containing inquiries pertaining to basic biodata, sociodemographic details, bacteriological profiles of the urine and ureteric double J stent culture. The data obtained was analyzed using SPSS v. 21.0.

RESULTS

Among the sample 51.6% of the patients were males, while the remaining 48.4% were females. The mean age of the sample stood at 38 (SD ± 9.1). The total incidence of bacterial colonization was seen in 61.64% and 19.6% of stent and urine cultures respectively, with Enterococci being the commonest (54.8%) organism in stent culture and Pseudomonas Aeruginosa being the commonest (32.6%) in urine culture.

Conclusion

After careful consideration, it can be concluded that the incidence of bacterial colonization among both cultures, in addition to the detailed bacteriological profiles of urine and ureteric double J stent culture differ considerably and urine culture may not serve as an ideal indicator of stent colonization and antibiotic prophylaxis should continue to be practiced among symptomatic patients despite a sterile urine culture.

KEYWORDS

Bacterial Colonization, Ureteric double J Stent, Prophylaxis, Sterile Urine & Bacteriological Profile.

INTRODUCTION

The renal system is vulnerable to many pathologies. Statistics yielded by global burden of disease show that ailments pertaining to the renal system are responsible for an approximate 0.8 million deaths, giving them the 12th rank among all causes of mortality (1.4% percent of cumulative mortality). Pakistan ranks eight in renal disease causing 20,000 deaths every year. Among the common pathological renal conditions prevalent are chronic kidney disease, glomerulonephritis, polycystic kidney disease urinary tract infections and renal calculi. ^[1,2]

In the developed world, stones of the renal system have a high incidence, with one in every thousand people acquiring stones of the renal system annually. The incidence is expected to rise in the developing world. ^[3] Pakistan is situated in the middle of Afro-Asian stone belt. Stone disease is an increasing problem in the Sindh province. Approximately 10 to 20 percent of all kidney stones require surgical removal. ^[4, 5] However, even despite removal, patients may experience significant pain while passing urine or face blockage of the urinary tract owing to edema (following surgery) and may thus need an alternate route to void urine. Artificial ureteric stents serve that purpose temporarily till the patient has healed and can safely revert to normal process. ^[6]

Double J stent (JJ stent) are commonly used for drainage of the urine from kidney to bladder to bypass ureteric obstruction. Use of double J stent have become an integral part of endo-urological procedures ^[7] but morbidity (ranging from minor suprapubic pain and heightened urinary frequency and urgency to major hematuria and even displacement and blockage of stent due to bacterial encrustation) associated with stent placement is encountered by up to three

quarters of all patients with double J stents. Bacterial encrustation is known to heighten nearly two weeks following the placement of double J stent and is followed by bacteriuria (bacterial presence in the urine).^[8]

Some believe that stent colonization though undetectable at the early stage, can be identified if bacteria are shown in the urine, however, the sensitivity of this strategy is debatable with some literature suggesting that the urine may remain sterile even when a significant bacterial colonization exists in the stent,^[9] while other published evidence showing a strong association between positive urine culture and double J stent culture. Most common organism isolated from both urine culture and stent culture are Escherichia coli (E coli), enterococcus, staphylococcus species, pseudomonas and candida specie. Thus a wide array of organisms may be implicated in colonization of stents and the urine.^[10]

METHODOLOGY

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Inclusion Criteria

1. All patients being stented for urinary tract stone.
2. Patients with negative urine culture pre-operatively.
3. Patients with positive urinary cultures but treated for 5–7 days with sensitive antibiotics.
4. Patients having age between 10-70 Years
5. Either gender

Exclusion Criteria

1. Specimens showing budding yeast cells along with other multiple organisms (Bacteria) visible on microscopy.
2. Patients with known untreated UTI.
3. Known case of congenital anomaly of urinary system which predisposes to UTI.
4. Patient with co morbid like Diabetic nephropathy.

RESULTS

Among the sample 51.6% of the patients were males, while the remaining 48.4% were females and the male to female ratio was thus roughly equal. The age of the sample ranged from 18 years to 62 years. The mean age of the sample stood at 38 (SD \pm 9.1).

Fig 1: Gender

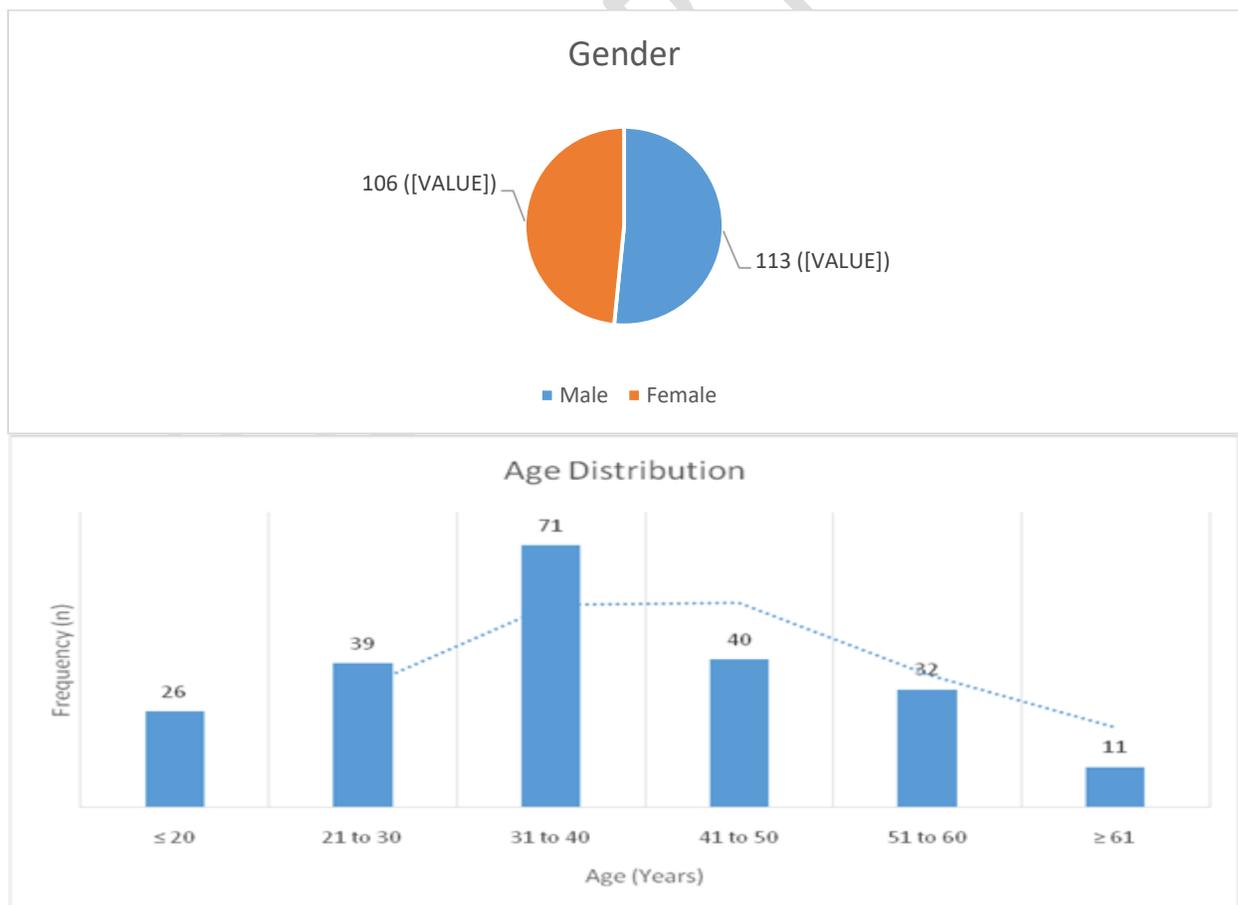


Fig 2: Age Distribution

The total incidence of bacterial colonization was seen in 61.64% and 19.6% of stent and urine cultures respectively.

Table 1: Bacterial Colonization

Bacterial Colonization (Stent)		Frequency (n)	Percentage (%)	P value
Positive	Male	79	58.5%	0.0412*
	Female	56	41.5%	
Negative	Male	34	40.5%	
	Female	50	59.5%	

Table 2: Bacteriuria

Bacteriuria		Frequency (n)	Percentage (%)	P value
Present	Male	31	72.1%	0.0391*
	Female	12	27.9%	
Absent	Male	82	46.6%	
	Female	94	53.4%	

Enterococci were the commonest (54.8%) organism in stent culture and Pseudomonas Aeruginosa being the commonest (32.6%) culprit in urine culture.

Table 3: Organism in Stent Culture

Organism in Stent Culture	Frequency	Percentage
Enterococci	74	54.8%
E. Coli	28	20.7%
Gram Positive Rods	11	8.2%
Neisseria Subflava	07	5.2%
AcinebtobacterBaumannii	05	3.7%
Candida Albicans	03	2.2%
Pseudomonas Aeruginosa	03	2.2%
Streptococcus Viridans	02	1.5%
Staphylococcus Epidermis	02	1.5%

Table 4: Organism in Urine Culture

Organism in Urine Culture	Frequency	Percentage
Enterococci	09	20.9%
E. Coli	11	25.6%
Pseudomonas Aeruginosa	14	32.6%
Acinetobacter Baumannii	04	9.3%
Candida Albicans	03	7.0%
Staphylococcus Epidermis	02	4.6%

DISCUSSION

Published evidence states bacterial colonization rates to vary from 33% ^[11] and 44% ^[12] to as high as 54.3% in temporary stents and as high as 100% in permanent stents. ^[13] This matches the the high rates of bacterial stent colonization in our research. One may argue that the stents may have been placed for longer duration in this study subjects but the mean duration of double J stent placement was a meagre 64 (SD \pm 27) days, which when compared to the international norms; stands at 6 weeks i.e. 35 days. ^[14, 15]

The commonest microorganisms responsible for colonization of double J stents were identified to be Enterococci (54.8%), followed by E. Coli, Gram Positive Rods, Neisseria Subflava, Acinebtobacter Baumannii, Candida Albicans, Pseudomonas Aeruginosa, Streptococcus Viridans and Staphylococcus Epidermis in order of decreasing frequency. When compared to literature, the results were synonymous with Riedl CR ^[16], who reported E. Coli to be among the commonest colonizing organisms.

The detailed look reveals that although enterococci are the commonest colonizing organisms in our and in international research, the incidence is much higher (25%) than reported norm in our research. Thus prophylaxis strategies must include agents specifically targeting this organism to achieve fewer instances of colonization and lesser blockage rates. However, this contradicts the local findings by another study which report gram negative organisms to be the commonest infecting organisms colonizing ureteric stents. ^[17]

An interesting observation was the low incidence (19.6%) of bacteriuria in the research. This may be interpreted in a variety of ways. Firstly, it is in harmony with findings reported in the literature, which suggest a low incidence of bacteriuria despite high level of bacterial

colonization in the ureteric stent. ^[18] There have been a few exceptions though, especially after stent manipulation as is reported by Rao et al. ^[19] Thus the ability of urine culture to predict stent colonization is minimal and a sterile urine should not be taken as a sign of the ureteric stent being free from infective agents. The overall sensitivity & specificity of urine culture is thus poor in this regard.

Additionally, the organisms isolated from the stent culture and the urine culture (pre DJ removal sample) too do not always match. Despite enterococci being most prevalent organism in stent culture, the prevalence of enterococci was considerably reduced and thus it came third to E. Coli and Pseudomonas Aeruginosa. Many of the other organisms isolated in stent culture did not make it to the urine. This too is a sign that not only urine culture has limited efficacy in predicting whether the stent is colonized or not, it also has poor performance in predicting the colonizing organisms accurately. Thus the choice of antibiotics should not be made on the basis of urine culture only. There is ample research exploring the outcomes of patients being administered antibiotics based on urine culture sensitivity findings, however the results are not encouraging. ^[20, 21]

CONCLUSION

After careful consideration, it can be concluded that the incidence of bacterial colonization among both cultures, in addition to the detailed bacteriological profiles of urine and ureteric double J stent culture differ considerably and urine culture may not serve as an ideal indicator of stent colonization and antibiotic prophylaxis should continue to be practiced among symptomatic patients despite a sterile urine culture.

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

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